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SUPPLEMENTARY NOTE ON NORTH AMERICAN
LABOULBENIACEÆ.

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In a previous note "On Some North American Species of Laboulbeniaceæ,"* the writer gave a short account of the family, at the same time enumerating the North American species then known, with the intention of illustrating them in a monograph, together with any subsequently discovered forms, as soon as practicable. The additions of a single season, however, have been so considerable, that it seems best to defer still longer a monograph which, if based on the data at present available, could not even approach completeness. A very limited opportunity for observation during the past summer, both as to time and as to locality, has served to more than double the number of forms previously reported; so that the family bids fair to become a numerous one in this country, where with the present additions its members already outnumber all the known exotic species. It seems, therefore, very desirable to obtain further information, if possible, especially concerning extra New England forms, before attempting a general work upon the subject.

Of the species described below, the very remarkable form which is called *Zodiomyces* is chiefly interesting, and forms a distinct departure from any of the known genera of the group. In *Cantharomyces* and perhaps in *Peyritshiella* an approach is made toward a compound type; but so high a development of this type as is found in the new genus was hardly to be looked for, and is suggestive of the many interesting possibilities of variation which further study of the family may bring to light.

Peyritshiella receives one additional species, which indicates that the genus is a well marked one, corresponding to the diagnosis previously

* These Proceedings, *ante*, page 5.

given in all respects except for the absence of a single supra-basal cell, the receptacle in the present species becoming multicellular above the basal cell. Further material of *Cantharomyces*, although diligently sought for on Staphylinidæ, has not been obtained. The new genus *Hesperomyces* seems to present such important differences from its ally, *Stigmatomyces*, as to render necessary the separation of the two. The lateral development of its asci, as well as the lower insertion of its antheridial appendage, suggest its relationship to *Helminthophana*, as does its very large, thrice-constricted perithecium.

The additions to the genus *Laboulbenia*, which do not include several species descriptions of which are reserved until further material can be obtained, are, as usual, the most numerous, and conform strictly to its more simple type. The highly developed branching trichogyne, previously mentioned in connection with *L. elongata*, is present in a number of the species described, and in the younger stages at least the bottle-shaped antheridia, to which attention was called in my previous paper, are invariably present. From the latter the emission, singly, of spermatia has been repeatedly observed. The definite isolation of asci containing immature spores, an observation readily verified in *L. Nebriæ*, should also be mentioned as setting the ascomycetous nature of the group beyond further question. Other points of morphological interest have been noticed in connection with certain abnormal forms, in which the perithecium may be partly or wholly replaced by antheridial appendages, with or without the usual black base of insertion; while in a few cases, where fertilization had apparently not taken place, the initial cells which usually give rise to asci were observed to produce numerous long filaments growing out through the pore of the perithecium and filled with spermatia-like bodies.

As in the previous note, the term receptacle is used to designate the main body of the fungus, the side bearing the perithecium being spoken of as the *inner*, while that bearing the pseudoparaphyses is spoken of as the *outer*, where this distinction is possible. As a matter of convenience, the eight typical cells of the receptacle in *Laboulbenia* are numbered as follows: the basal (1); the supra-basal (2); the cell above 2 on the outer side (3); the cell above this (4); the cell formed by a partition across the upper inner angle of 4 is numbered (5); the cell above 2 on the inner side is numbered (6); while of the two remaining small cells which form the base of the perithecium the inner is numbered (7), the outer (8).

ZODIOMYCES nov. gen.

Main body of the fungus tapering to a narrow base of attachment, parenchymatously multicellular; the distal end cup-shaped, with a more or less well marked rim, within which arise directly from the central parenchyma numerous stalked perithecia and simple, septate sterile filaments. Perithecia asymmetrical; the apex bent to one side; appendaged; borne on simple, septate pedicels, having a rounded prominence just below the perithecium. Spores hyaline, fusiform, asymmetrically once-septate, involved in mucus.

ZODIOMYCES VORTICELLARIA nov. sp.

Livid with a central yellowish tinge, the base more or less suffused with dull purple above the almost black point of attachment. Perithecia numerous: at first terminal, then lateral by the subsequent outgrowth of the terminal cell of the simple, cylindrical, several-septate pedicels which bear them: strongly bent away from a pair of ear-like appendages placed close together near the summit which curve away from the almost symmetrical rounded apex of the perithecium. Two additional appendages, longer, more slender, slightly curved and tapering, arise from slight prominences on opposite sides of the perithecium, at a point about two thirds of the distance from the base to the apex. Sterile filaments arising among the perithecia; simple or rarely branched, cylindrical, septate, tapering slightly towards a rounded apex and extending some distance beyond the perithecia. Main body, or receptacle, trumpet-shaped; made up of very numerous small, squarish or slightly elongate cells, smaller towards the distal end and disposed in more or less regular transverse layers; the base of attachment composed of several small cells placed side by side and more or less deeply tinged with purple. The basal portion may or may not grow out laterally, on one or both sides, forming rounded processes of parenchymatous cells of variable size, which may be in contact with, though not attached to, the host. Spores slender, fusiform, hyaline, slightly granular, involved in mucus, asymmetrically once-septate, $45 \times 2.5-3 \mu$. Perithecia $55 \times 15-18 \mu$; ear-like appendages $15-30 \times 5 \mu$; lateral appendages, maximum $50 \times 3 \mu$; pedicels $35-50 \times 3.5-4 \mu$. Sterile filaments (longer) $200 \times 3-4 \mu$. Main body exclusive of perithecia and sterile filaments, largest observed $400 \times 185 \mu$ at distal end; smaller specimens $225 \times 100 \mu$.

On legs of *Hydrocombus lacustris*. Connecticut.

This extraordinary plant was found in a single locality near New Haven, and appears to be very rare, ten specimens only having been observed. In large individuals the number of perithecia may reach one hundred or more, in various stages of development. The trichogyne is simple, growing downwards from the apex of the immature perithecium; but no sign of any antheridial appendage was seen on the same pedicel, unless it is represented by the apical cell of the latter, or its outgrowth, which appears, however, to be developed after fertilization. It is also possible that the differentiation between the sexes has led to their complete separation, and the male may be represented by certain short-stalked bodies resembling very young perithecia. The point where the trichogyne emerges is not, as in *Laboulbenia*, the point which subsequently becomes the apex of the perithecium; but, as is probably the case also in *Cantharomyces* and perhaps other genera, becomes lateral as the latter develops. The two pairs of appendages are doubtless protective and appear after the perithecium has attained considerable size. The lateral outgrowths from the base of the main body, or receptacle, are singular productions, also doubtless protective, serving as cushions against sudden lateral bending.

HESPEROMYCES nov. gen.

Perithecium asymmetrical: thrice transversely constricted, with an abruptly conical, appendiculate apex: borne on two cells, one of which is prolonged downwards to form a pedicellate connection with the receptacle. Receptacle of three cells, one basal and two distal, from the outer of which arises the antheridial appendage; from the inner (as a bud) the stalked perithecium. Antheridial appendage simple, cylindrical, septate, with a single lateral row of tooth-like projections.

HESPEROMYCES VIRESCENS nov. sp.

Color wholly yellowish green. Perithecium very large: nearly straight on the inside, rounded externally; its three constrictions at nearly regular intervals; tapering slightly to the base and abruptly to the often slightly bent, sharp apex; the apex proper made up of two sharp more or less evenly apposed, nearly equal projections, enclosing the apical pore between them; while lower down in a plane at right angles to these are two more appendages placed laterally (the perithecium and antheridial appendage being considered antero-posterior) on opposite sides of the apex, finger-like, curved outwards and

often once-septate. External to the base of each of these finger-like appendages is a short projection. The outer basal cell of the perithecium is small, sub-triangular; the inner continued downwards beyond the outer into a rather broad pedicel connecting with the receptacle. Receptacle composed of three cells: the basal simple, with a small black base of attachment to the host, bearing distally two cells: the outer small, roundish, or polygonal; the inner larger, extending some distance obliquely downwards on the inner side of the basal cell, and forming the base of the pedicellate perithecial cell which occupies its whole upper face: the smaller outer cell gives rise to the antheridial appendage, which occupies only a portion of its upper face. Antheridial appendage slightly constricted at its base, which is wholly distinct from the pedicellate basal cell of the perithecium: subcylindrical, five-septate, each cell above the second giving rise to single (exceptionally two) curved, rather slender tooth-like projections, one terminal, the rest lateral and external, each (except the terminal one) separated by an oblique partition from the cell which bears it. Spores of the usual type, sometimes appearing more than once-septate, the smaller segment sometimes vacuolate and spherically distended at one point: $65 \times 6 \mu$. Perithecium proper (without basal cells) $250-260 \times 66 \mu$; longer apical appendages $40-45 \mu$. Receptacle (proper) $75 \times 30 \mu$. Antheridial appendage $75 \times 13 \mu$. Total length to tip of perithecium $300-400 \mu$; average 375μ .

On *Chilocorus bivulnerus*. California.

It is not without some reluctance that this form is separated generically from *Stigmatomyces*, to which it is most nearly allied, especially through its antheridial appendage, which is very similar to the form occurring in this genus. The genus is based chiefly upon the very peculiar appendiculate perithecium, and the different relative position of its antheridial appendage. Another important point of difference lies in the fact that, while in *Stigmatomyces* the asci arise by budding upwards from the base of the perithecium, in the present genus the ascogenic area is lateral, the asci budding downwards, outwards, and upwards from a portion of the wall of the perithecium opposite and below its lowest constriction, on the inner side. In its younger stages the receptacle is triangular, and the perithecium and antheridial appendage bud from its two upper angles obliquely outwards and upwards, the former on a slender base at first, which ultimately becomes vertical, continuing the main axis of the receptacle, while the antheridial appendage becomes sub-lateral in position. The trichogyne is simple and of large diameter.

I am indebted to the kindness of Mr. Coquillet for sending me two specimens of *Chilocorus* bearing this parasite upon the legs and ventral surface of the abdomen, on which it is conspicuous from its large size and contrasting color.

PEYRITSCHIELLA MINIMA nov. sp.

Hyaline or slightly yellowish. Perithecia large, tapering slightly to a blunt, 4-papillate, symmetrical apex. Paraphyses sometimes brownish, of two or three rounded joints: on the inner side, in sets of (typically) three each in a transverse row, surmounting prominent, slightly overlapping projections from three successive cells placed one above the other, the lowest being the third above the basal cell of the receptacle. On the outer side, above the sharp projection characteristic of the genus, and external to the base of the perithecium, are usually three more similar pseudoparaphyses. Receptacle short, stout, subtriangular, of twelve or more cells; the small basal cell being the only one which is single. Spores of usual type $37-40 \times 4 \mu$. Perithecia $100 \times 33 \mu$. Paraphyses, maximum 35μ . Total length to tip of perithecium 190μ ; maximum 220μ . Receptacle $90-110 \times 50-58 \mu$.

On *Platynus cincticollis*. Connecticut.

A very distinct and minute species, hardly visible with a hand lens, growing singly on the extremities of its host. The peculiar sharp process, also present in *P. curvata*, does not project laterally beyond the receptacle, as in the last named species, and is therefore visible only when the receptacle is so placed that its inner side lies to the left. Single perithecia only were observed in the seven specimens which constitute the types, although more than one may be found to occur, as is very rarely the case in *P. curvata*. Without reference to other points of difference it is at once separable from *P. curvata* in having no single supra-basal cell, the receptacle becoming multicellular immediately above the basal cell; a circumstance which renders necessary a modification of the generic diagnosis previously given, in which the supra-basal cell is described as single.

LABOULBENIA CASNONIÆ nov. sp.

Evenly pale olivaceous. Perithecium rather long, with a black patch below the apex on the inner side: apex hyaline, slightly oblique outwards. Pseudoparaphyses hyaline, olivaceous near the base: the outer simple, nearly straight, slightly divergent: the inner consisting of a small basal cell from which arise several branches, which may in

turn be once branched, not attaining, however, more than half the length of the outer pseudoparaphysis: disk of insertion oblique. Receptacle moderate, cell (1) rather short subtriangular; cell (2) large; cells (3) and (6) about equal. Spores of usual type $35-40 \times 4 \mu$. Perithecia $75 \times 30 \mu$. Pseudoparaphyses: outer, maximum 170μ ; inner 75μ . Total length to tip of perithecium 160μ ; greatest width $35-40 \mu$.

On *Casnonia Pennsylvanica*. Connecticut.

A very small species, not nearly allied to other forms, yet without marked individual characteristics beyond its uniform pale olivaceous tint, and the peculiarity of its pseudoparaphyses. Sixteen specimens examined from the tips of the elytra and abdomen of the host.

LABOULBENIA TRUNCATA nov. sp.

Dark olive-brown, sometimes nearly opaque. Perithecia large, the middle third expanded slightly just above the insertion of the pseudoparaphyses, otherwise subcylindrical; the dark truncate apex slightly oblique inwardly, usually as broad as the base, with large nearly hyaline lips about the pore. Pseudoparaphyses two: the outer straight, stout, dark brown at the base, unbranched, tapering to a slender hyaline apex: the inner short, slender, simple, hyaline, its base occupying less than a third of the horizontal black disk of insertion, which is situated about opposite the middle of the perithecium. Receptacle short, wedge-shaped: cell (1) triangular, its lower half nearly hyaline, its upper as dark as the basal portion of the outer pseudoparaphysis; cell (2) large, about as broad as long, separated from cell (6) by a long oblique partition extending nearly across the receptacle, and from cell (3) by a very short, nearly horizontal septum; cells (3) and (4) about equal: cell (6) very flat; cell (8) rather large, triangular; cell (7) almost obsolete. Spores of usual type $60 \times 4.5 \mu$. Perithecia $90-100 \times 35-40 \mu$. Pseudoparaphyses, outer 150μ . Total length to tip of perithecium $175-180 \mu$. Greatest width 66μ .

On *Bembidium* sp. Connecticut.

A very small and singular species approaching *L. Nebriæ* in the type of its pseudoparaphyses, while its peculiar perithecium distinguishes it at once from other known species. Twelve specimens only were examined from the legs of an undetermined species of *Bembidium*.

LABOULBENIA ARCUATA nov. sp.

Usually strongly curved inwards, hyaline or slightly smoky, except for the perithecium. The latter very large, smoky black, nearly opaque, tapering slightly to a broad, rounded, less deeply colored apex, which is symmetrical or slightly oblique inwardly. Pseudoparaphyses two, hyaline or tinged with brown, projecting obliquely outwards, arising from two basal cells: the inner small, roundish; the outer several times as large and bearing the larger of the two pseudoparaphyses, both of which are one to three times branched above the supra-basal cell; disk of insertion oblique, about one fifth of the distance from the base to the tip of the perithecium. Cell (1) of the receptacle long and broad, usually curved; cell (2) somewhat shorter, divided from (6) by a very oblique partition, from (3) by a nearly horizontal one; cells (7) and (8) involved in the opaque color of the perithecium. Spores of usual type $65 \times 4.5-5 \mu$. Perithecia $160-185 \times 50-55 \mu$. Pseudoparaphyses, maximum 240μ . Total length to tip of perithecium $300-350 \mu$; average 320μ .

On *Harpalus Pennsylvanicus*. Connecticut.

A somewhat rare species, occurring on the legs of its host in small tufts, and readily seen even without a hand lens. It may be recognized by its usually very strong curvature and the association of a large opaque perithecium with a hyaline or only slightly smoky receptacle. Described from thirty-five mounted specimens.

LABOULBENIA CONFERTA nov. sp.

Hyaline or tinged with smoky brown, the base of the perithecium and the adjacent cells often dark brown. Perithecium short and broad; tapering rather suddenly towards the apex, which is black except about the hyaline pore, and slightly oblique outwardly. Pseudoparaphyses hyaline or brownish; the outer much the largest, its basal cell twice as large as that of the inner, and giving rise typically to three branches, themselves once or twice two- to three-branched above their basal cell; the inner similar but smaller; both the outer and inner varying to more simple forms: disk of insertion small, very slightly oblique, placed slightly above the base of the perithecium. Receptacle rather long: cells (1) and (2) about equal, cell (3) usually about twice as large as (4) and (5) together. Spores of usual type $50 \times 16 \mu$. Perithecium $130 \times 60 \mu$. Pseudoparaphyses, maximum 300μ . Total length to tip of perithecium 300μ ; greatest breadth 70μ .

On *Harpalus Pennsylvanicus*. Connecticut.

Occurs in usually single, crowded tufts on the legs of its host. It is a rare species, allied to *L. elegans*, from which it is at once distinguished by its pseudoparaphyses. Described from twenty-six mounted specimens.

LABOULBENIA PAUPERCUA nov. sp.

Color brown to blackish or slightly olive. Perithecium rather broad; the apex hyaline about the pore, black on the inside. Pseudoparaphysis single; hyaline, slightly smoky near the base, simple or once dichotomously branched above the supra-basal cell: a usually short antheridial branch arises from the left side of the basal cell (the pseudoparaphyses being considered as placed anteriorly); disk of insertion oblique, about one quarter of the distance from the base to the apex of the perithecium. Cells (1) and (2) of the receptacle rather short: (2) separated from (3) and (6) by usually oblique septa: cell (5) usually wholly or partly free from the perithecium, or sometimes obsolete: spores of usual type $45 \times 4.5 \mu$. Perithecia $100 \times 40 \mu$. Pseudoparaphysis, maximum 350μ . Total length to tip of perithecium $160-222 \mu$.

On *Platynus extensicollis* and a Carabid beetle (undetermined) found in dry fields. Connecticut.

A small and inconspicuous species, usually growing scattered on the thorax or elytra of its host. It is distinguished from all other described species by its anomalous single paraphysis. Described from twenty mounted specimens.

LABOULBENIA SCELOPHILA nov. sp.

Color olive or smoky olive, cell (1) usually colorless. Perithecium large, subcylindrical, greenish olive, tapering somewhat abruptly to the rather small apex; which is hyaline about the pore, blackish on either side, and bent slightly towards the pseudoparaphyses. Pseudoparaphyses three, the outer and inner arising from two main basal cells, the basal cell of the third inserted like a wedge between them, and thus arising from the septum which divides them: all three pseudoparaphyses once to twice dichotomously branched and very strongly curved inwards so as usually to pass beyond and partly conceal the apex of the perithecium; disk of insertion horizontal, situated a little more than one third of the distance from the base to the apex of the perithecium. Receptacle short, tapering evenly to a slender base: cell (2) twice as long on the outer as on the inner side, separated from

cell (6) by a very oblique, almost vertical septum; from cell (3) by a short, horizontal septum: cell (6) twice as broad as long, its upper and lower septa parallel: cell (7) nearly obsolete; cell (8) rather large, triangular. Spores of the usual type $50 \times 5 \mu$. Perithecia $100-120 \times 40-50 \mu$. Pseudoparaphyses, maximum 180μ . Total length to tip of perithecium $200-220 \mu$. greatest width 55μ .

On *Platynus extensicollis*. Connecticut.

Occurs in small numbers always on the legs of its host, its most noticeable character being the curvature towards one another of the pseudoparaphyses and the apex of the perithecium. A rather rare species, described from thirty-two mounted specimens.

NOTE. — Types of all the species of Laboulbeniaceæ described by the writer are contained in Herb. R. Thaxter and Cryptogamic Herbarium, Harvard University.